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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/668,024

09/22/2003

Robert J. Frank

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1422

7590
Attention: Kyle Eppele
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400 Collins Rd. NE
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06/19/2007

EXAMINER

EJAZ, NAHEED

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

06/19/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/668,024

Applicant(s)

FRANK, ROBERT J.

Examiner

Naheed Ejaz

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9-14 is/are allowed.
- 6) ☒ Claim(s) 1, 4-8, 15, 18 and 19 is/are rejected.
- 7) ☒ Claim(s) 2, 3, 16, 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.
2. Applicant argues with respect to claim 5, the Examiner states Tc is a dwell time and not a sub-dwell time as previously asserted and Beamish does not contain the proper disclosure to reject applicant's claimed limitations. This is not persuasive since Beamish teaches that dwell time Tc is divided into two transmit periods (Tx) (figure 5, col.6, lines 67, col.7, lines 1-4) which reads on claim limitations of having sub-dwell time.

Response to Amendment

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4 & 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emi (6,047,018) in view of Kwon et al. (2006/0239334) (hereinafter, Kwon).
5. As per claim 1, Emi teaches, by definition nominal frequency is the midpoint in the pass band and Emi is teaching frequency hopping method utilizes a broad occupied frequency band width by hopping the carrier frequency of the modulated data according to a spread code pulse which is spread by balanced modulation of a direct

spread code pulse (col.1, lines 25-31) and thus include the midpoint in the pass band associated with the respective frequency thus it reads on claim limitations of 'establishing a nominal transmission frequency'), 'establishing a dwell period' (see figure 1) (it is noted that in figure 1 time period between two hops T1 & T2 represents the dwell time (in the light of Specification, page # 2, paragraph # 1) and read on claim limitations), 'defining a predetermined frequency modulation pattern about the nominal transmission frequency, the predetermined frequency modulation pattern being suitable to vary the nominal transmission frequency during the dwell period' (col.2, lines 22-35) (it is noted that Emi is forming a combined pattern of seven frequencies of digital data by performing primary modulation and based on these frequencies, frequency pattern is being selected (col.2, lines 22-27) which is equivalent to the claim limitations of 'predetermined frequency modulation pattern about the nominal transmission frequency' & assigning of sub-frequency according to the predetermined frequency modulation pattern. Moreover, Emi teaches, 'transmitting the message according to the random ordering of the nominal sub-frequencies' (see Abstract).

Emi does not teach sub-dwell periods and random ordering of sub-dwell periods.

Kwon divides dwell period into a plurality of sub-dwell periods, where each sub-dwell period has a nominal sub-frequency assigned thereto (figures 14D, 14E & 14F), 'randomly ordering the plurality of sub-dwell periods and the respective assigned nominal sub-frequencies' (figures 14E & 14F, page # 15, paragraph # 0237) (it is noted that Kwon is teaching time hopping in order to represent multidimensional hopping pattern by a two dimensional coordinate of transmission time and subcarrier (paragraph

Art Unit: 2611

0237) which is equivalent to claim limitations of random ordering of sub-dwell periods since figure 14E shows irregular transmission time hopping (page # 8, paragraph # 0125). Additionally, Kwon divides the time 't' on x-axis into small intervals (claimed dividing the dwell period into plurality of sub dwell periods because small intervals are between two sub frequencies) with respect to sub-carriers (claimed sub frequencies) and transmission rate R (figure 14D) and frequency hopping uses sub carriers related to multi carriers (page # 12, paragraph # 0215, lines 16-22, page # 17, paragraph # 0265).

It would have been obvious to one of ordinary skill in the art, at the time of invention, to implement the teachings of Kwon into Emi in order to distinguish the stations by the pattern in the respective squares while prevent the multidimensional hopping pattern collision by performing the time hopping and frequency hopping in sparse channels as taught by Kwon (paragraph # 0237) thus enhance system performance.

6. As per claim 4, Emi teaches all the limitations in the previous claim on which claim 4 depends but he fails to disclose band-limiting filter.

Kwon discloses, 'band-limiting filter to each randomly ordered nominal sub-frequency' (figure 3B, elements 320 & 340, page # 2, paragraph # 0027, lines 17-19)

It would have been obvious to one of ordinary skill in the art, at the time of invention, to implement the teachings of Kwon into Emi in order to limit the band according to desired frequency (well known in the art) and have the hopping pattern based on the limited band thus increase the system efficiency.

7. As per claim 6, Emi teaches all the limitations in the previous claim on which claim 6 depends but he fails to disclose pseudo-random number generator.

Kwon discloses, 'the random ordering of the nominal sub-frequencies is performed using a pseudo-random number generator' (figures 10A & 11, page # 12, paragraphs # 0214).

It would have been obvious to one of ordinary skill in the art, at the time of invention, to implement the teachings of Kwon into Emi in order to improve the performance of the multidimensional resource hopping multiplexing system, refining transmission for the collisions of multidimensional resource hopping patterns can reduce the overall perforation probability as taught by Kwon (see Abstract).

8. Claims 5, 15 & 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emi (6,047,018) in view of Kwon et al. (2006/0239334), as applied to claim 1 above, and further in view of Beamish et al. (6,865,216) (hereinafter, Beamish).

9. As per claim 5, Emi and Kwon teach all the limitations in the previous claim on which claim 5 depends but they fail to disclose nominal transmission frequency being one of a plurality of frequency hops.

Beamish teaches, 'nominal transmission frequency is one of a plurality of frequency hops of a frequency hopping strategy, and wherein the dwell period is an amount of time the frequency hopping algorithm is configured to maintain the one of the plurality of frequency hops' (figures 3 & 5, col.6, lines 13-23, 33-37 & 61-66) (it is noted that Beamish teaches that dwell time T_c , there is a first transmit period (T_x) and second transmit period (figure 5, col.6, line 67, col.7, lines 1-8) which reads on claim limitations

Art Unit: 2611

of having sub-dwell period since dwell period T_c is divided into two transmit periods (T_x)).

It would have been obvious to one of ordinary skill in the art, at the time of invention, to implement the teachings of Beamish into Emi and Kwon in order to increase data transmission rate within the currently available bandwidth by employing frequency hopping spread spectrum modulation as taught by Beamish (col.4, lines 36-39) thus increase system performance.

10. Claim 15 is rejected under the same rationale as mentioned in claims 1 & 6 rejections above. Moreover, it is noted that Kwon is teaching time hopping to represent multidimensional hopping pattern (figure 4h, paragraphs # 0044 & 0237) and in figure 14E & 12D hop time t is divided and arranged on x-axis with respect to sub carriers (claimed sub frequencies since frequency hopping is using sub carriers) with each hop and in time hopping, time is being ordered in different positions from their previous ones in order to hop, therefore, randomly ordering of the plurality of sub-intervals of time (claimed sub dwell periods (see claim 1 rejection above)) and transmitting the message based on them, would be inherent to time hopping). Furthermore, Kwon teaches that frequency hopping uses sub carriers (claimed sub frequencies since sub carriers have frequencies associated with) (page # 12, paragraph # 0215, lines 16-22 & page # 17, paragraph # 0265).

11. Claim 18 is rejected under the same rationale as mentioned in the claim 5 rejection above.

12. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Emi (6,047,018) in views of Kwon et al. (2006/0239334) & Beamish et al. (6,865,216), as applied to claims 1 & 5 above, and further in view of Lindsey (6,434,184).

13. As per claim 7, Emi and Kwon teach all the limitations in the previous claim on which claim 7 depends but they fail to disclose frequency jitter pattern. Emi teaches that at f2 is selected in time slot T1 (claimed dwell period) and f3 in time slot T4 (figure 4, col.2, lines 21-47) which reads on claim limitations 'at least one of a frequency increase and a frequency decrease during the dwell period.'

Lindsey teaches, 'frequency modulation pattern is a frequency jitter pattern' (col.4, lines 65-67, col.5, lines 1-5).

It would have been obvious to one of ordinary skill in the art, at the time of invention, to implement the teachings of Lindsey into Emi, Kwon & Beamish in order to include jitter in the hop frequencies so that security concerns are satisfied as taught by Lindsey (col.4, lines 66-67, col.5, line 1) thus enhance system reliability.

14. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Emi (6,047,018) in view of Kwon et al. (2006/0239334), as applied to claim 1 above, and further in view of Nagazumi (5,084,901).

15. Refer to claim 8, Emi and Kwon teach all the limitations in the previous claim on which claim 8 depends but they fail to disclose frequency chirp.

16. Nagazumi teaches, 'frequency modulation pattern is frequency chirp characterized by one of an increase and a decrease in frequency during the dwell period' (figures 7a, 7b, col.1, lines 8-13, col.5, lines 63-68 & col.6, lines 1-12).

It would have been obvious to one of ordinary skill in the art, at the time of invention, to implement the teachings of Nagazumi into Emi and Kwon in order to resist the noise and the variation of transmission line characteristics in the system by implementing generating a signal whose frequency is gradually changes (chirp system) for frequency hopping system as taught by Nagazumi (col.1, lines 26-38, col.21, lines 2-8) thus raises transmission performance.

17. Claims 14 & 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emi (6,047,018) in views of Kwon et al. (2006/0239334) and Beamish et al. (6,865,216), as applied to claims 1 & 15 above, and further in view Nagazumi (5,084,901).

18. Claims 14 & 19 are rejected under the same rationale as mentioned in the claim 8 rejection above.

Allowable Subject Matter

19. Claims 2, 3 and 16, 17 are objected to as being dependent upon a rejected base claims, claim 1 & 15 respectively but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. Claims 9-14 are allowed.

21. As per claims 9-14: the following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach or suggest a method of minimizing detectability of a message transmitted by a frequency hopping algorithm, the method comprising: for each randomly ordered nominal sub-frequency, varying the nominal sub-frequency during the respective sub-dwell period by one of increasing and decreasing the nominal sub-frequency; and transmitting the message at frequencies by

Art Unit: 2611

which each randomly ordered nominal sub-frequency has been increased or decreased as recited in claim 9 and in combination with other elements of the claim.

Contact Information

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Naheed Ejaz whose telephone number is 571-272-5947. The examiner can normally be reached on Monday - Friday 8:00 - 4:30.

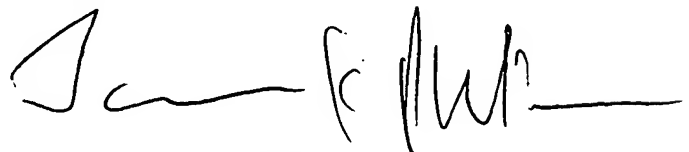
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NE

5/30/2007

Naheed Ejaz
Examiner
Art Unit 2611



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